A REDESCRIPTION AND BIOLOGY OF *PROBETHYLUS SCHWARZI* ASHMEAD (HYMENOPTERA:SCLEROGIBBIDAE) WITH NOTES ON RELATED SPECIES[1,2]

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The genus *Probethylus* was first established by W. H. Ashmead (1902) based on a single male specimen of *P. schwarzi* from Arizona. No female of *P. schwarzi* has been previously found. Richards (1939) revised the genus to include three species: *P. schwarzi* Ashmead, *P. callani* Richards, and *P. mexicanus* Richards. He described the female of *P. callani* and the males of *P. callani* and *P. mexicanus* using very good morphological characters. However, *P. schwarzi* was not redescribed and the scant original information by Ashmead was used in a key.

On April 21, 1968, specimens of the embiopteran, *Anisembia texana* Melander, were collected among mosses in the Wichita Mountains Wildlife Refuge, Comanche Co., Oklahoma. The embiids were cultured in the laboratory, and *P. schwarzi* was taken from the culture during June and August of that year. With these additional collections, the male and female of *P. schwarzi* are here redescribed and illustrated, *Probethylus* is reviewed, a key to the species is presented, and notes on the biology of *P. schwarzi* are also included.

Probethylus Ashmead, 1902

Probethylus Ashmead 1902:268-273; Richards 1939:211-223.

DESCRIPTION: Male. Black; may become dark brown with age. Head and thorax dull, generally punctured or shagreened. Abdomen shiny; dorsum flattened with seven visible segments. Wing hyaline, covered with short pubescence; costal (C), marginal (MA), submarginal (SMA), medial (M), and submedial (SM) cells present in front wing (Fig. 1); hind wing with prominent jugal lobe. Antenna with 20 to 26 segments with much fine pubescence. Genitalia with volsella of two distal lobes, gonosquama and gonostipes fused or contiguous for their width.

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[1]Authorized for publication as paper no. 4318, on October 20, 1972, Journal Series of the Agricultural Experiment Station, The Pennsylvania State University, University Park, Pa. 16802.
[2]Accepted for publication: November 27, 1972.
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Female. Light testaceous in color; dull without punctures. Wingless. Head short-pyriform in dorsal view; ocelli in equilateral triangle; mandibles with three distal teeth; maxillary palpi with three segments; labial palps with two segments; antenna with 18 to 26 segments. Fore and mid tibia with one prominent spur, hind tibia with two spurs. Sting slightly projecting.

Discussion. The sclerogibbids generally resemble other groups in the Bethyloidea except in the greater number of antennal segments. However, *P. schwarzi* females may have 18 segments, a number less than the 20 to 23 which is found in *P. callani.* This character is still useful in most keys separating related families such as the Dryinidae or Bethylidae which have 10 to 13 antennal segments.

Key to the Species of PROBETHYLUS

1. Wingless; fore leg with greatly enlarged femur (females) 2
   Wings present; fore leg normal (males) 3
2. Anterior edge of each abdominal tergite darkened; antennae 20-23 segmented . . . . . **P. callani**
   Base of first abdominal segment dark; conspicuous dark band on segment 3; antennae 18 segmented . . . . . **P. schwarzi**
3. Notaulices incomplete; head and mesonotum shiny, pitted or punctured 4
   Notaulices complete; head and mesonotum shagreened, slightly punctured . . . . . **P. callani**
4. Notaulices extending half way across mesonotum; head and notum pitted and punctured; antennae 21-23 segmented . . . . . **P. schwarzi**
   Notaulices extending 4/5 the way across mesonotum; head and notum with fine punctures; antennae 25 segmented . . . . . **P. mexicanus**

Note on Known Species

P. schwarzi Ashmead, 1902

Known from a single male specimen from Arizona. It was described as the type species for the genus in a key without proper description. The host and the female of this species was previously unknown, but has now been taken from *Asembia texana.*

P. callani Richards, 1939

Known from a good series of males and females from Trinidad, British West Indies, and Mexico. The host was an unidentified embiid.

P. mexicanus Richards, 1939

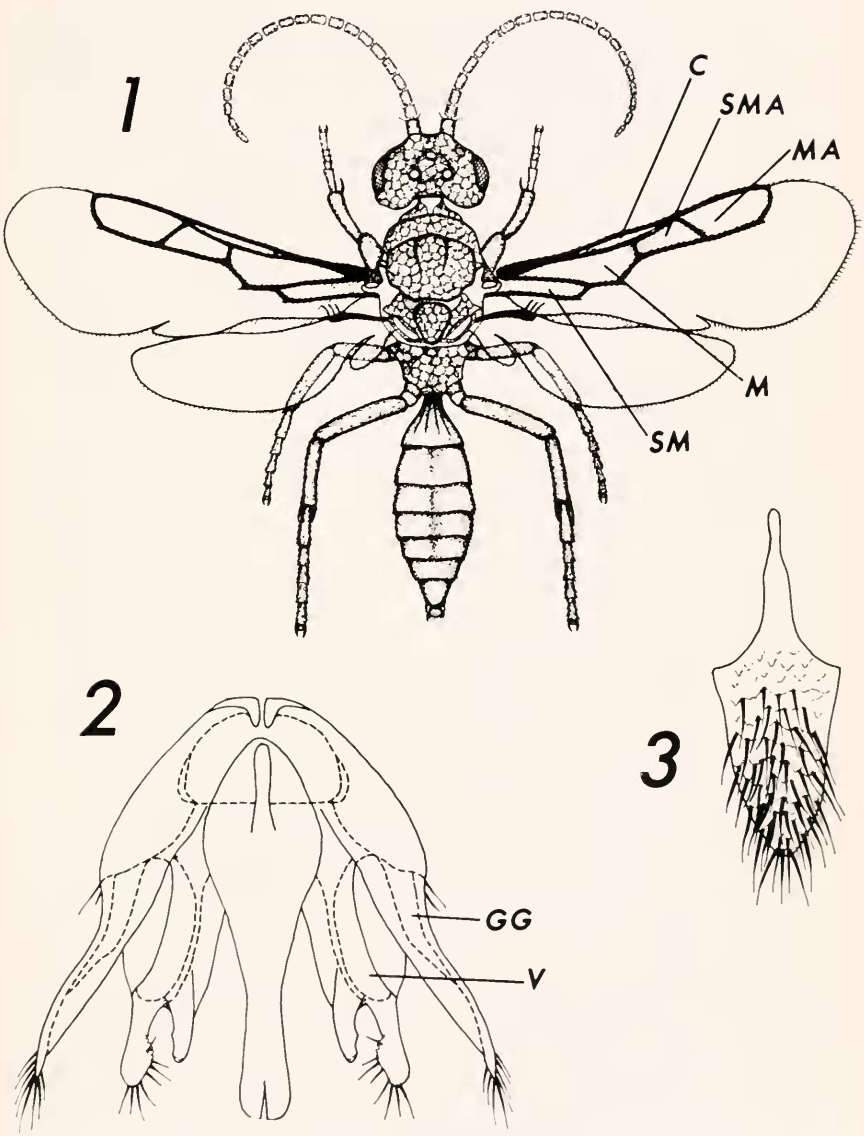
Described from two males from Mexico. The female and host are unknown.

Probethylus schwarzi Ashmead

Probethylus schwarzi Ashmead 1902: 268-273; Richards 1939:211-223.

TYPE DATA: "Oracle, Arizona, 1-7, E. A. Schwarz" Holotype male is deposited in the collection of the U. S. National Musuem.

DESCRIPTION: Male (Figs. 1, 2, 3). Body black with dense short pubescence; length 1.9-2.1 mm. Antenna usually 22 segmented but occasionally 21 or 23 segmented, distal two segments sometimes fused. Head, notum, and scutellum shiny with large coarse punctures. Notaulices extending half way across mesonotum. Wings hyaline, entire surface covered with a short pubescence; marginal cell elongate and narrower than submarginal cell. Base of abdomen with longitudinal furrows, first 2-3 segments having shallow pits. Genitalia with ventral lobe of volsella (V) smaller than dorsal lobe and concave on inner surface, armed with tubercles and bristles; gonostipes and gonosquama (GG) fused with a series of small bristles over its entire length, large bristles on distal surface. Bristles on ninth sternite irregular in arrangement.



Figs. 1–3. *Probethylus schwarzi* Ashmead male; 1, adult male; 2, genitalia; 3, morphological 9th sternite.

Wing cells: C–coastal, MA–marginal, SMA–submarginal, M–medial, SM–submedial.

Genitalia: V–volsella, GG–gonostipe and gonosquama.

Female (Fig. 4). Light testaceous; single dark band on third abdominal segment; base of first abdominal segment dark; length: 2.7 mm. Head flattened, pyriform; conspicuous impression present in mid-dorsal line just posterior to front margin; eyes large pubescent; ocelli reddish, forming an equilateral triangle; antenna 18-segmented. Thorax dull, unpunctured; pronotum longer than wide. Wings absent. Fore legs with greatly enlarged femur and tibia; first tarsal segment elongate, flattened, tarsi 2-4 broad and short. Mid and hind coxa with prominent anterior and posterior dorsal keels; mid and hind femur grooved ventrally for the reception of the tibia. Sting slightly projecting.

DISTRIBUTION: Arizona and Oklahoma.

Host: *Anisembia texana* Melander

Specimens Examined: Four males and one female in the collection of the U. S. National Museum; 2 males in the Frost Entomological Museum, Pennsylvania State University; 2 males in the University of Oklahoma Stovall Museum; 3 males and 1 female retained in author's collection.

Notes on the Biology of *Probethylus schwarzi* Ashmead

The embiid *Anisembia texana* was collected on April 21, and specimens were reared in a 4-inch finger bowl covered with a plastic petri dish top. The culture was supplied with dead moss and sprinkled with water and powdered rat food pellets every week. This culture yielded 2 females of *P. schwarzi,* one on June 14 and another on June 20. During early July, one or two parasite larvae per embiid nymph were seen in a transverse position over the first or second abdominal segments of some of the embiid nymphs. Callan (1939), who reared *P. callani* from an unidentified embiid from Trinidad, stated that the parasitic larvae were "...bright yellow..." and "...occupied a transverse position on the dorsal surface of the thorax of the host, being attached usually between the head and prothorax or between the pro- and mesothoriacic segments." The larvae of *P. schwarzi* often caused the embiid abdomens to be slightly deflected (Fig. 5). On July 19, a mature larva of *P. schwarzi* was seen, being cream colored instead of yellow. The wasp cocoons were made of white silk with embiid frass and debris adhered to the surface. A total of 9 males and one dwarf (male) were collected from the culture from August 6 to August 14.

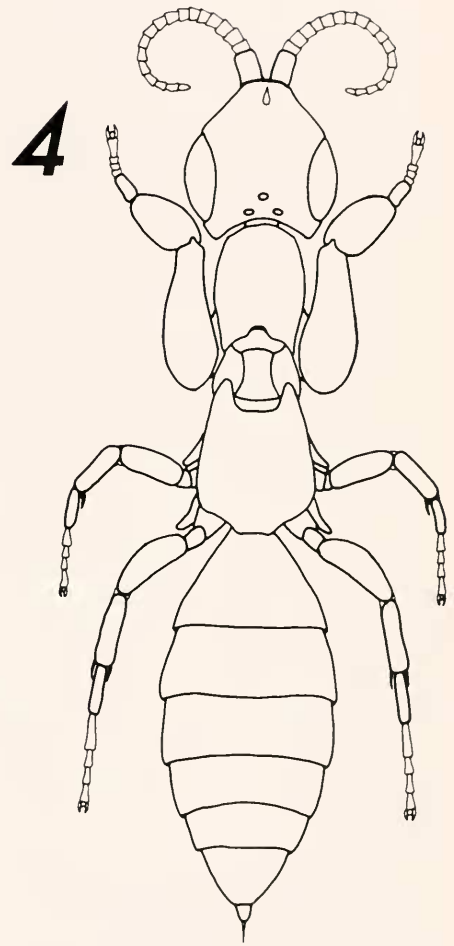
The female wasps were very active and easily ran among the embiid webs. The larval period of the parasite appears to be five to six weeks and pupal stage is about two weeks. The males were also very active but usually stayed out of the embiid webs. Parasites supplied only with water lived no more than 4 days. The parasitized embiids were usually smaller than normal, but were apparently not hampered in normal activity. The wasp larva upon maturation seems to kill the embiid nymph and eat the remains as has been observed for *P. callani.*

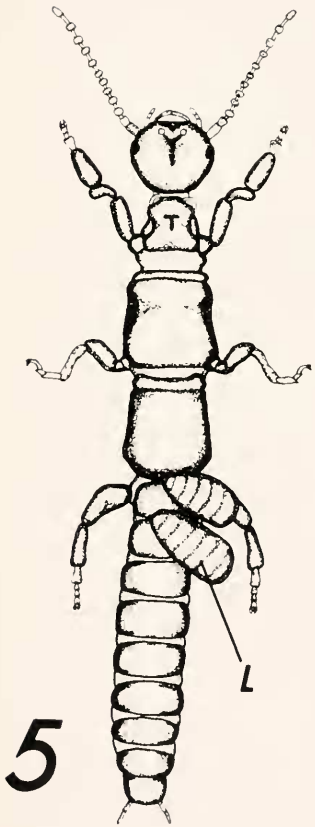
No male parasites were present when the females were active. Thus, it is doubtful that any females were mated. Since only male parasites were produced in the second generation, *P. schwarzi* might be considered arrhenotokous.

The embiid host, *A. texana,* has a known range of Texas, Louisiana, Arkansas, Mississippi, and Oklahoma; and *P. schwarzi* could thus be expected to be found in the same area but may require rearing of the embiids to show its presence.

ACKNOWLEDGMENTS

Many thanks to Dr. A. S. Menke at the U. S. National Museum for his comparison of material with the type and for information concerning the type. My sincerest thanks to Dr. K. C. Kim for his kindly suggestions and help, and to Miss D. D. Wilder for her editorial assistance.





Figs. 4–5. 4, *Probethylus schwarzi* female adult.
5, *Anisembia texana* Melander nymph with two parasite larvae (L).

LITERATURE CITED

Ashmead, W. H. 1902. Classification of the fossorial, predaceous and parasitic wasps, of the superfamily Vespoidea. Family XXXII. Bethylidae. Canad. Entom. 34:268-273.

Callan, E. McC. 1939. A note on the breeding of *Probethylus callani* Richards (Hymenopt., Bethylidae), an embiopteran parasite. Proc. Roy. Ent. Soc. Lond. Ser. B. 8(11):223-224.

Richards, O. W. 1939. The bethylidae subfamily Sclerogibbinae (Hymenoptera). Proc. Roy. Ent. Soc. Lond. Ser. B. 8(11):211-223.

ABSTRACT:—The genus *Probethylus* (Hymenoptera, Sclerogibbidae) is reviewed and a key to the species is included. *Probethylus schwarzi* Ashmead is redescribed and illustrated based on male and female specimens reared from *Anisembia texana* Melander (Embioptera:Anisembidae). The embiids were collected from the Wichita Mountains Wildlife Refuge, Comanche Co., Oklahoma. *P. schwarzi* seems to be arrhenotokous. Notes on the biology of *P. schwarzi* are also made.

Descriptors: Hymenoptera; Sclerogibbidae; *Probethylus,* redescription: *schwarzi;* arrhenotoky; Embioptera; Anisembidae; *Anisembia texana.*

Letter to the Editor

Sir:

I find the note on "Saturniids as Bat Mimics," appearing on page 72 of *Entomological News,* Vol. 84, March, 1973, ludicrous. The title itself is completely out of line, since the ensuing two paragraphs do not establish that saturniids mimic bats in any feature except size.

Almost every sentence contains statements that must be challenged. The first one, describing saturniid moths as "clumsy" in flight, reflects only that author's opinion; it is not a quality that can be measured, and it is quite possible that other people would consider the flight graceful. "Swiftness" and "ability to dodge" likewise are not given baselines, and we do not know with what other forms, normally preyed upon by bats, the author is comparing saturniids. "Evolution seems to have neglected to give the flying adult saturniids any ability to escape from predatory bats" is such an opinionated mishmash that it is hardly worth pointing out that no evidence is presented for that conclusion.

The author states that most saturniids have a "strong unpleasant odor." On the contrary, I find the odor of each species very pleasant, since it reminds me of the happy years of study I have enjoyed with these marvelous creatures. At most, if some others do not find the odors pleasant, I would urge that "unpleasant" be changed to "characteristic." Next, one reads that saturniids' "broad downy wings and flight characteristics" make it possible, or probable, that bats think they are other bats. That is very odd, since bats' wings are *naked,* and the anatomy of the respective flight appendages so remotely different that entirely separate aerodynamic principles come into play.

I believe that bat mimicry can be dismissed as a hypothesis on the arguments presented in this communication. If saturniids do indeed possess relative immunity from attack by bats, it is more likely to be based on the fact that bats capture prey in flight within a basket formed by one or the other wing and the interfemoral membrane. Most saturniids are simply too large to be taken readily in this manner.

C. Brook Worth
R. D. Delmont, N. J.
July 2, 1973